Quarterly Journal of the
Central States Numismatic Society

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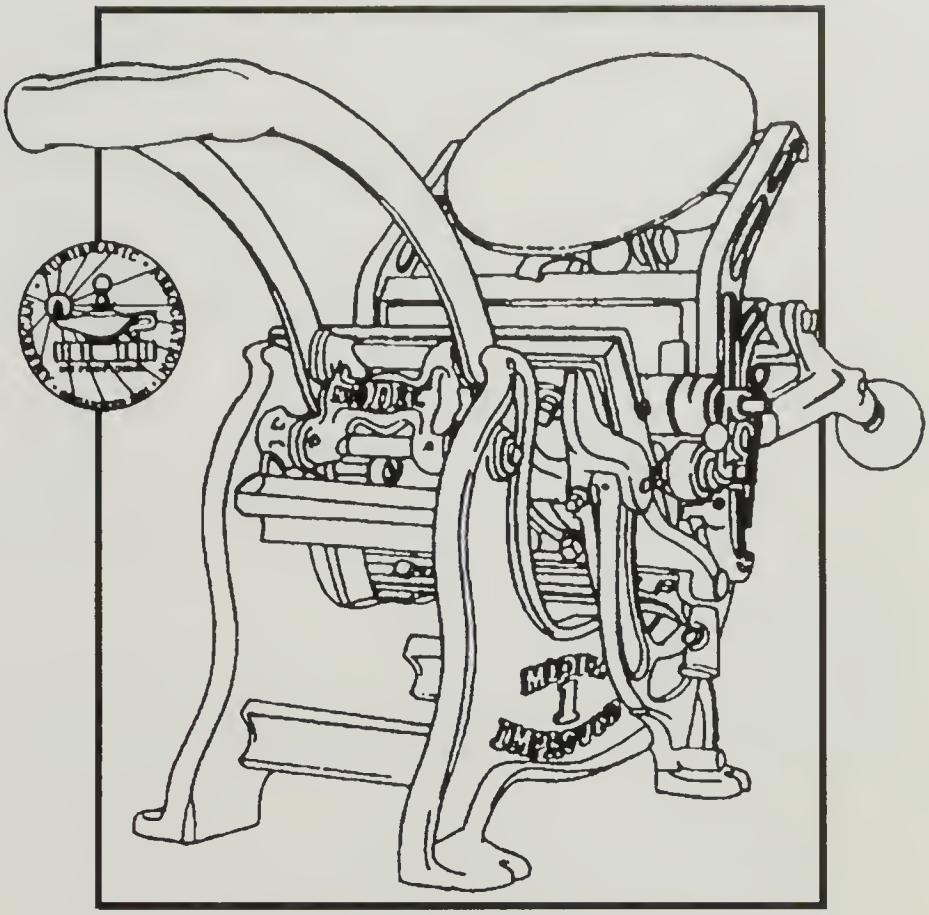

FIRST PLACE

Outstanding Regional Numismatic Publication

1998

CENTRAL STATES
NUMISMATIC SOCIETY

The Centinel

Fall 1998
Volume 46, Number 3

the centinel

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Friday - Saturday
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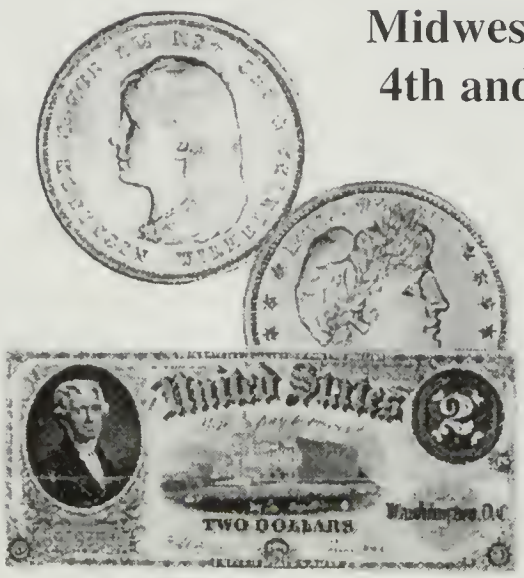

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★ Educational Exhibits
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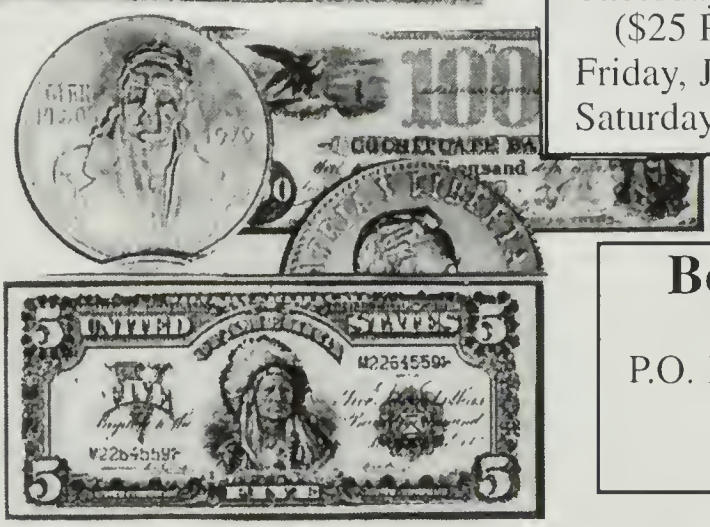

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P.O. Box 573, Milwaukee, WI 53201
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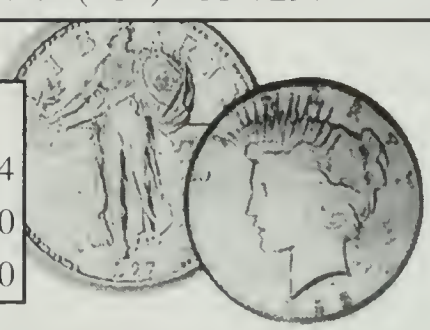

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The Centinel has been recognized as the outstanding regional numismatic publication by the American Numismatic Association. *The Centinel* has won this award four consecutive years and is edited by Karen and Jim Jach.

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Presidential Commentary

Roger Winkelhake

By the time you read this our fall meeting in Harvey, Illinois will be history. Kermit Wasmer and his ILNA team are great hosts and put on a fine convention.

The CSNS board minutes from Harvey will appear in the winter issue of *The Centinel*. Jerry Lebo has everything under control. We don't anticipate any controversial discussion at the fall board meeting.

CSNS notice for the scholarship(s) to the 1999 ANA seminar will appear in both the fall and winter issues of *The Centinel*. The awardees will be announced at the spring 1999 CSNS convention in Milwaukee.

Scholarship(s) for 2000 will be awarded earlier because the very popular seminars are nearly full when our awardees make their reservations with ANA. We anticipate the notice for 2000 will appear in the spring 1999 issue of *The Centinel*. The announcement of the 2000 awardees will be made at the fall 1999 board meeting.

This is a great opportunity for young numismatists and adults to receive scholarships to the ANA seminar that are worth approximately $1,000 each.

Karen and Jim Jach have done it again. A first place award from ANA for *The Centinel*. They do a great job for our organization as editors of *The Centinel*.

Plans are well underway for our spring 1999 convention in Milwaukee, April 22-25. Kevin Foley put forth an outstanding effort in negotiating a contract with the new convention center.

Milwaukee is a great host city for our conventions. If you haven't attended a CSNS or other major show in Milwaukee, I encourage you to plan on attending the 1999 convention. In addition to a fine convention you will enjoy the great cuisine and other attractions of the city.

Roger Winkelhake
President

A Message from the Secretary

Jerry Lebo

Congratulations to Editors Karen and Jim Jach for winning the ANA Regional Publication contest for the fourth straight year. Each issue of *The Centinel* is worth reading as Karen and Jim present a variety of articles covering different aspects of our hobby.

The ANA convention in Portland this summer also produced another *Centinel* honor, this time from the Numismatic Literary Guild. Its award for best article in a regional publication went to Steve Roach of Michigan for his Centinel story on coinage design in the first quarter of the 20th century. The story was

published last year just before Steve moved from YN status to regular membership.

Here's a special toast to Bob Julian, one of our contributing authors to *The Centinel*. Bob was elected to the ANA Numismatic Hall of Fame during the Portland convention. That's about as good as it gets.

I know a number of other CSNS members won honors and awards at ANA. I simply didn't have a list as this was being written immediately after the convention. I do know that Bob Hendershott's 100th birthday party drew several hundred people. Happy birthday, Bob. You're a real gentleman.

CSNS Governor Brian Fanton of Iowa also is due congratulations for being named outstanding adult advisor by the ANA at its summer conference. Brian was among the instructors on hand at Colorado Springs.

Our fall convention Sept. 11-13 in Harvey, Ill., promised to be another smashing success. However, because of publishing deadlines, we'll have to wait until the winter issue to bring you a full account. We can report that the bourse was sold out nearly two months in advance.

Special recognition is due the crew from the Illinois Numismatic Association, which sponsored our fall convention for the second straight year. The convention general chairman was Kermit Wasmer, who also was ILNA president the past few years. Kermit, incidentally, is also general chairman for the ANA convention in Chicago next year.

Bourse Chairman Clayton Hagemann can take a bow for selling out the Harvey bourse well in advance of the convention. Our own CSNS Governor Jack Huggins Jr. also was heavily involved in the show preparations, wearing his ILNA hat Jack was scheduled to succeed Kermit as Illinois State president at the Harvey show.

Meanwhile, we're thinking ahead to next year's 60th anniversary CSNS spring convention in a brand new facility in Milwaukee. By the time you read this, bourse applications should be in the mail to hundreds of dealers. If you're a dealer wanting a bourse application, and don't have one by Oct. 15, please contact me (219-753-2489).

Kevin Foley will again serve as general chairman for our convention, and yours truly will reprise his role as bourse chairman. Ray and Fran Lockwood return as exhibit chairpersons. You may contact them at 2075 E. Bocock Rd., Marion, Ind., 46852. Phone 765-664-6520.

Belated thanks and congratulations to Illinois dealer Steve Vesely for playing a key role in the recovery of stolen coins and the arrest of the man charged with the theft.

I say belated because it was at our April convention in Milwaukee that Vesely helped the police nab their suspect.

According to show Security Chairman Tom Casper, Vesely bought a 1909-S Indian Cent from the suspect and later showed it to another dealer, who recognized it as having been stolen from yet a third dealer, who also happened to be at the convention.

To make a long story short, the suspect was later arrested. Several stolen coins were recovered and returned to their owners. Before being hauled off to

jail, the suspect repaid Vesely for the stolen coin he had sold him.

Our sympathy to Rollie Finner on the July death of his mother, who lived to be 98. Rollie, of course, is a past CSNS editor and currently runs the message center (with wife Betty) at our spring conventions.

You might wonder why it sometimes takes a while for things to get into *The Centinel*, such as membership applications and the like. That's simply because considerable lead time is necessary to get the information to the editors and then into print. And, of course, keep in mind *The Centinel* is published only four times a year.

We've had some success lately in finding "lost" members, thanks to other members who knew their whereabouts. "Lost" members are usually those who have moved and didn't notify us. Attempts to send them mail resulted in the mail being returned. We then published their names in *The Centinel* as "lost."

Even though our success of late has amounted to finding a half dozen or so lost members, there are 40-some others who have moved during the past three years and whose whereabouts we don't know.

Incidentally, not all "lost" members are really lost. There have been several occasions where we had correct addresses, but for some mysterious reason the postal service failed to deliver the mail, returning same to us instead. Henceforth, if a letter or *Centinel* comes back as undeliverable, we're going to mail to the same address one more time before listing anybody as "lost."

One final note about mailing *The Centinel*. We found at least one postal worker with a sense of humor. One copy of *The Centinel* was accidentally mailed without an address label. It was returned with this handwritten notation: "Returned for better address."

Jerry Lebo
Secretary-Treasurer

Future CSNS Conventions

1999–April 22-25 .....Milwaukee, Wisconsin
Jerry Lebo 219/753-2489; Fax 219/753-4379
1999–September 10-12.....Cincinnati, Ohio
2000–May 4-7 .....Minneapolis, Minnesota
2001–April 5-8 .....Indianapolis, Indiana
2002–April 25-28 .....Columbus, Ohio

NOTE TO CLUB OFFICIALS

Interested in hosting a future CSNS Convention? It is not too early to begin thinking of the future! Submit your letter on invitation to the CSNS Secretary-Treasurer at your earliest convenience. Your request will receive the prompt attention of the Officers and Board of Governors.

Membership Applications

The persons named below have applied for membership in the Society. Each applicant will become a member in 30 days, unless a written objection to his or her application is received by the Secretary-Treasurer prior to that date.

REGULAR MEMBERS

7872	Dan Rich	Columbus OH
7874	Tom Havelka	Coshocton OH
7877	Michael Paul Schiller	Allouez WI
7878	Evan Gale	Conifer CO

ASSOCIATE MEMBERS

7875	Ryan Williams	Littleton NH

JUNIOR MEMBERS

7873	Katherine E. O'Brien	Milwaukee WI
7876	Jonathan P. Stange	Shaker Heights OH

LIFE MEMBERS

666	Al Pinkall	Amherst NH
667	Quad City Coin Club	Moline IL
668	Don Keopple II	Hampton IL
669	Lee Minshull	Palos Verdes Peninsula CA
670	Steve Mileham	St. Louis MO

LOST MEMBERS

Paul Burke	High Ridge MO
Marc Goldsmith	Tampa FL
Dr. Stuart Goodstein	Southfield MI
Greg Holloway	West Palm Beach FL
James G. McCarthy	Bohemia NY
Mark L. Milliman	Del Mar CA
Mark Stephenson	Lexington KY
Rodney Puckett	Austin TX
Robert McGee	Austin TX

In Memoriam

The Board and membership of the Society join in extending our heartfelt condolences to the family and friends of the following member who passed away recently.

L 222	Marvin F. Gross	Kansas City MO

Midwest Express Named Official Airline

Kevin Foley, General Chairman for the Central States Numismatic Society's 60th Anniversary Convention, which will be held April 23-25, 1999 at the new Midwest Express Center in downtown Milwaukee, has announced that Midwest Express has been named the official airline for the convention.

Kevin Foley, General Chairman of the 60th Anniversary Convention, is shown signing the "official airline" contract with Joanne Ziesemer, a representative of Midwest Express.

Foley said, "Midwest Express has offered our attendees a valuable package of travel discounts. Anyone booking their reservation more than 60 days in advance of departure will receive a 10% discount off whatever fare they would otherwise qualify for. Convention goers booking 60 days or closer to departure will get a 6% discount. All they need to do is call the Midwest Express convention desk at (800) 452-2022 and mention Convention File Number C552 to qualify for the discount. Milwaukee is the home base and hub for Midwest Express and they offer non-stop service from many major cities across the country. Their all coach cabin offers two by two leather seats and is the equivalent of most carriers' first class service from the standpoint of leg room and meal service quality. I'm please to have Midwest Express participate in our event and know our members will be impressed by their service."

Foley continued, "The Midwest Express Center is Milwaukee's new state of the art convention center and is located one block South of the old MECCA Convention Center, site of the 1998 Central States Convention. I'm impressed by the new center and know our members will be also. The meeting rooms for our educational programs and seminars are much more attractive than at our former Milwaukee site and the exhibit hall which will house our bourse area is large and well lit."

Dealers who'd like bourse application for the 60th Anniversary Convention should contact Bourse Chairman Jerry Lebo at P. O. Box 841, Logansport, IN 46947, or call him at (219) 753-2489.

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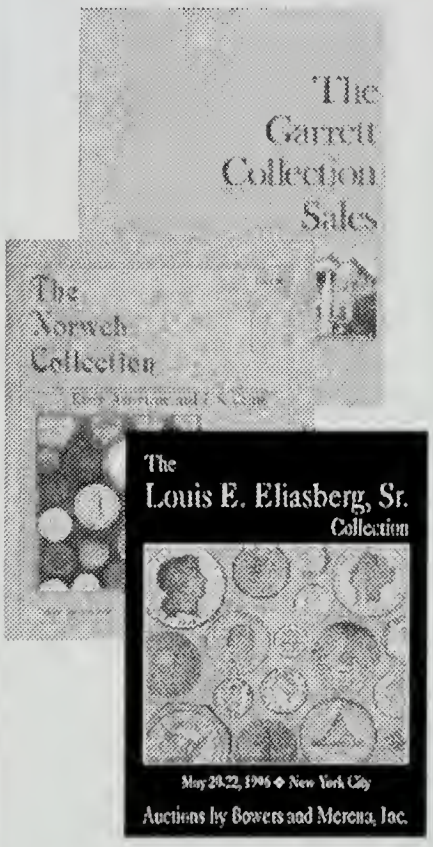

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A WORLD OF VALUES

A General Scientific Understanding of the Corrosion and Resulting Coloring of Silver Coins

by Leonard J. Lis, Ph.D

INTRODUCTION

One of the greatest challenges that face the United States is to re-establish itself as a premier technological innovator. Politicians, educators, and informed members of the public have established the link between the decline in technological innovation with the decline in scientific knowledge and education by the citizenry of this country. Major parts of this mis-education is the acceptance of pseudo-science, and the proliferation of incorrect scientific information by educators in the non-scientific community. The 'science' of numismatics must be refocused so that it, too, can be at or near the forefront in helping to educate adults and students in scientific matters related to the production, and aging of numismatic items.

There have been a number of recent articles, editorials, and letters regarding the nature of environmentally caused oxidation at the surface of a silver coin. These efforts have attempted to use scientific definitions to argue whether the surface layer caused by the oxidation of silver by atmospheric sulphur was 'damage.' Unfortunately, most of the attempts to use science to justify an aesthetic position with regards to which type (natural or toned) of coin is the most desirable to collect, suffer from the bias of the collector/ writer, and the apparent use of jargon and field definitions instead of well formulated definitions of general scientific phenomena.

From a metallurgical standpoint, corrosion of silver is a well known and defined process. As stated by Prof. Allison Butts, the study of silver was relatively complete before 1940. This article will briefly explain the definition of surface damage, define the conditions for toning to occur, discuss possible optical techniques for surface film studies, present some specific suggestion for appropriate jargon and definitions, and critique the issue of artificial vs. natural toning. The perspective of this discussion is not the mechanical integrity of the object affected, but

the atomic level changes that occur at the surface of a material. This is a more appropriate approach given the current state of scientific knowledge about the underlying mechanisms and effects of material surface corrosion.

CORROSION: SURFACE DAMAGE OR ?

It is well known that silver reacts with sulphur to form an oxidation layer on silver coins. Less well understood among the numismatic community is the extent (if any) to which this layer modifies the 'surface' of a coin. Part of the difficulty in reconciling the different stated positions is the standard use of the interpretive terms tarnish and toning to define this layer, rather than the more general terms 'rust', or corrosion.

Historically, the oxidation, or corrosion layer on a silver surface has been called 'rust'. Only recent attempts to distinguish degrees of structural damage to an object have resulted in the arbitrary use of the term tarnish to define the corrosion layer on a silver surface. However, since the cause of the silver oxidation layer remains the same, then tarnish must simply mean a formation of a corrosion layer at a surface in which the structural damage to the object is minimized. Typically, this film absorbs all colors of light except that which gives it its characteristic hue. The color is present throughout the layer. Thus, the oxidation layer previously described as tarnish must involve damage to the coin's surface.

Similar arguments can be used to indicate that toning, which involves the production of an extremely thin oxidation layer on a silver surface (a thin film in optical jargon), must also involve corrosion and thus surface damage. Toning, then, is the apparent coloring of a coin's surface due to the presence of a very thin corrosion layer, which causes constructive interference between some wavelengths of light reflected from the top and bottom interfaces of the corrosion layer, and destructive interference to all other reflected wavelengths as viewed by the eye, with minimal damage to the object's bulk structure.

A recent refocusing of surface science has occurred due to the use of materials in biological implants, and chemical catalysts. In these cases, whether an object has mechanical failure is less relevant since corrosion products formed at the material surface can inactivate the catalyst, cause implant rejection, and/ or result in the creation of a toxic substance. Corrosion can thus be defined as any electrochemical or chemical

process resulting in chemical, and sometimes, mechanical changes of the metal surface due to the interaction between the metal and its surrounding atmosphere. It can be broadly considered the movement of an interphase interface with its chemistry being that of a heterogeneous system.

Neither the beauty of the surface nor the time required for the oxidation layer to form can be considered a scientific criteria to distinguish a 'damaged' surface from an 'undamaged' surface. As will be discussed later, the difference between the toned, or tarnished layer is solely a matter of the thickness of the oxidation layer.

What is typically ignored in discussions of the silver oxidation layer are the following:

1. Oxidation products are continuously formed throughout the smelting of ore to metal, the production of a planchet, and the processing of a coin.

2. An oxidation layer is present even on 'white/natural' coins. This layer is so thin, much less than a wavelength of visible light (i.e., 400-700nm), that interference effects on the light being reflected from the coin's surfaces are negligible, and little light is absorbed.

It can be stated that the oxidation layer on a coin's surface must be a corrosion product, even if arbitrarily called tarnish or toning. However, this layer is present on all silver coins exposed to a sulphur atmosphere as currently exists, and therefore all silver coin surfaces can be defined as 'damaged'. Thus, the issue of surface damage cannot be raised as a justification for decreasing the value of a toned coin.

Finally, a misconception has arisen in the literature as to the possibility of atmospheric hydrogen sulfide attacking the surface of a silver coin as an acid. As indicated in the Merck Index, silver sulfide is relatively inert, although it is soluble in nitric acid. Thus, hydrogen sulfide would have to be extremely concentrated, which is difficult to do in an atmosphere with winds and air currents, to be able to attack a silver/silver sulfide surface as an acid, even to the extent of being toxic to humans. Any pitting, etc., that is observed on a silver coin's surface is probably due to preferential corrosion attack to those sites caused by impurities in the metal, oxygen deficiency in the region, and/or other galvanic corrosion processes.

STAGES OF FILM FORMATION

The oxidation layer on a coin's surface is a corrosion product caused by the exposure of the surface to atmospheric sulphur compounds. Continued growth of the film occurs as the coin is further exposed to atmospheric sulphur compounds, with sulphur diffusing across the oxidation layer and reacting with the underlying silver in the interfacial region.

For all materials, light can be transmitted through the material, absorbed by the material, and reflected by the surface of the material, at the same time. The apparent color of a coin's surface depends on whether surface reflection, thin film interference, or light absorption is the dominant physical process determining our visual perception. Which process is primary depends on the thickness of the oxidation layer.

1. 'WHITE or NATURAL' SURFACE

The recently minted coin is perceived to have what has been termed a 'white' or 'natural' surface, or a surface that appears to have no surface metal oxidation layer. In fact, the newly minted coin will have some part of its surface covered in a noncontinuous, or very thin continuous oxidation film. The thickness of the film is such that not enough light is absorbed to produce the color of the oxidation product layer, nor cause significant constructive or destructive interference between the light waves reflected from the top and bottom surfaces of the film.

2. 'TONED' SURFACES

Light is a wave, and, as such, can interact with other light waves such that the waves combine by the addition of the wave amplitudes (i.e. the displacement of a wave relative to a zero point). If waves with similar wavelengths (the distance between consecutive crests or troughs in a continuous wave) are completely in phase, or their wave amplitudes are the same at each position within the wave front, then the waves combine to form a more intense wave, or they constructively interfere. If the waves are completely out of phase, or their wave amplitudes are exactly opposite at each position within the wavefront, then the waves combine so that they cancel each other, or they destructly interfere. In all

other cases, the composite wave resulting from the combination of any two waves is intermediate to the two extreme conditions. Similar processes occur with sound waves coming from different sources/speakers.

In thin films, this process occurs above the film between the incoming light waves and the waves that have travelled through the film, been reflected off the under lying surface, and travelled back to a position just above the film, or in the observer's eye by the light waves reflected from the top and bottom interfaces of the film. The phase of the reflected wave may be affected by the distance travelled, and, in some cases, by the reflection process. The surface can appear unaffected, completely dark, or colored depending on the relative difference in the wave amplitudes between the incoming and reflected waves.

When the film thickness is exactly right, then some of the incoming and reflected light waves are destructively interfered with resulting in a perceived color due to the light waves that are not completely destructively interfered with. The thinnest films would first cause interference between light waves with the smallest wavelengths (i.e., blues and greens) resulting in the appearance of a surface colored red or yellow. As the film grows the wavelengths of the affected light waves increase so that the longer wavelength light (red or yellow) is destructively interfered with resulting in a surface colored green or blue.

3. 'TARNISHED' SURFACES

As the surface layer thickness increases, then reflection and/or interference are no longer the primary processes affecting our visual perception. There are so many atoms that can absorb the incoming light such that we perceive a surface color due to the light not being absorbed. In the case of silver sulfide, the film color become greenish-brown, with this hue present throughout the entire film thickness.

As the film becomes even thicker, no light reflected from the bottom interface can travel through the film. Atomic scatter of the light waves results in the light being internally scattered thereby being unable to escape through the film to the observer's eye. This limiting situation results in the film being perceived as black.

Thus, the perceived color of a silver coin's surface is determined by the film produced by the corrosion layer formed from the reaction of silver with sulphur. The surface morphology, as defined by the thickness

of this layer, is the sole determining factor in the thin film interference process used to produce a colored surface.

TO CLEAN OR NOT TO CLEAN?

As discussed above, the oxidation layer on a silver coin's surface is a corrosion product caused by the exposure of the surface to atmospheric sulphur compounds. Continued growth of the film occurs as the coin is further exposed to atmospheric sulphur compounds, with sulphur diffusing across the oxidation layer and reacting with the underlying silver. As the thickness of the oxidation layer increases, it acts to reduce its growth by making the diffusion of sulphur through the film more difficult and time consuming.

The question of whether one wishes to remove this layer or not is a matter of personal taste. Some collectors prefer a 'white' surface while others prefer 'toned' surfaces. A scientific discussion on whether to clean a coin with a toned (or even tarnished) surface cannot rely on an arbitrary criterion related to surface damage, since all silver coins have, to some extent, an oxidized/damaged surface. Thus, personal taste/market conditions will probably dictate what surface (white vs toned) a numismatist prefers to collect.

A review of surface science will, however, result in a better understanding of the corrosion processes that can occur under a previously formed oxidation layer, as well as, the phenomena that enhance oxidation on chemically cleaned surfaces. It should be noted that under an oxidized surface, galvanic corrosion (non-aqueous electron transfer) processes can occur. The inhomogeneity of the metal alloy used to produce the coin can lead to pitting at sites of higher chemical potential due to the presence of impurity elements. Thus, the formation of the corrosion layer due to atmospheric attack does not, in itself, cause pitting or etching into the coin's surface. In addition, preferential corrosion attack on areas with uneven protection can occur due to the flow of electrons from regions of thicker to thinner protection. Cleaning a coin may expose these areas with detrimental effect on the coin's value.

Some surface changes are reversible with an expenditure of energy, while others are completely irreversible within a reasonable time period. The reduction of silver sulfide to silver on a silver coin's surface can be accomplished with the expenditure of additional energy. Typically, this

is done with the use of a chemical cell in which an element with a higher affinity for the oxidant competes with the silver to form a chemical compound. The simplest such cell is produced by adding aluminum shot (or any other piece of aluminum with a high surface to volume ratio) to a water solution of baking soda in an inert pan. Any tarnished/toned silver surface dipped into the solution will eventually be reduced to atomic silver. The process can be speeded up by the use of a battery (electron source) attached to the oxidized surface and the reducing metal.

Original surface textures, however, cannot be reformed during the reduction of a silver sulfide compound to silver. Oxidation products are preferentially formed at points of curvature on a surface. These sites are considered sites of higher surface energy which can be lowered by the oxidation (loss of electrons) of the elemental metal atom. Metal flow lines caused by the mechanical processing are affected both at their base and tips. The redeposition of the silver will tend to minimize the surface energy, or, in other words, be evenly distributed across the surface.

Many collectors have observed a 'rapid' formation of toned/tarnished surfaces after chemical cleaning. The occurs because chemical cleaning of any metallic surface will result in a rougher surface at the atomic level. Thus, more atoms will be at higher energy states due to the presence of unshared electrons resulting in more atomic sites for preferential corrosion attack will be created resulting in an increase in the corrosion rate at the surface.

NATURAL VS ARTIFICIAL/DOCTORED TONING

Part of the recent interest in toning is derived from the collector's desire to be able to differentiate between toning that has occurred as part of the storage of a coin versus that which has been specifically induced to take advantage of the high premiums paid for attractively toned silver coins. Since many of the techniques that have been used to specifically tone a coin's surface occur naturally during the toning process (and thus cannot be term artificial), it is probably more appropriate to adopt the term doctored to indicate a specifically toned coin as suggested by Bob Campbell. As discussed by others, knowledge of coin styles/patterns is probably the best method to begin to distinguish between natural toning and toning due to dyes, oxidation layers produced by thin film deposition techniques, etc. The possibility of toned silver coin surfaces being produced by thin film deposition techniques is

particularly disturbing. The compound silver sulfide is readily available commercially, and solid state thin film deposition techniques have advanced to the stage that any thickness of material can be deposited in any pattern that the operator desires. Science, however, can be used to confirm some suspicious looking colors or color patterns.

1. Silver Sulfide Layers

The oxidation layer produced through the use of processes known to hasten the production of toning on a silver coin's surface (i.e. contact with high sulphur compounds such as egg yolks, onions, vulcanized rubber, etc., and/or the use of high temperatures) cannot be distinguished scientifically from the resulting layer produced by slower processes solely involving atmospheric sulphur compounds. As discussed previously, the thickness of the surface oxidation layer is the sole determinant of the color observed. Thus, as long as the corrosion layer is made of silver sulfide, and the observed colors are the same, then there can be no difference in the thickness or morphology of the layers. Only in extreme cases of elevated sulphur content, and high temperatures, is it possible for silver sulphate to form which can be detected using various x-ray absorption techniques. In films deposited by thin film deposition of commercially available silver sulfide, detection of a doctored surface may be possible if the amount and type of impurities in the various commercial silver sulfide preparations is known and within the detection limit of x-ray or electron absorption techniques.

2. Non-Silver Sulfide Layers

Since the thickness of a clear film is the sole determinant of the color produced by the interference between light reflected from the top and bottom interfaces of a surface layer, then oxidation layers of similar thickness produced by other metal oxides, etc. would produce a similar effect to that of silver sulfide. Such metal oxide films can be deposited on silver surfaces using thin film deposition techniques currently being developed for the production of thin film electronic devices. It would be necessary to use x-ray absorption techniques to determine the metal present in the oxidation layer.

Dyes in layers or atomic level packing defects (color centers) may also produce color on a coin's surface. In these situations, thin film

interference is not the physical process responsible for the apparent surface color, rather, a light absorption/emission process is occurs. It has been previously discussed by others that the smell of a surface and/or the appearance of fluorescent colors is the only way to detect colors due to dyes/color centers applied to a coin's surface. It should be specifically noted that fluorescent colors can only be due to an energy absorption/emission process, and cannot be formed by the interference between incident and reflected light waves. Naturally occurring fluorescent colors at a coin's surface are, thus, only remotely possible and depend on the availability of fluorescing molecules during the metal oxidation layer formation and growth.

However, optical techniques can be used to distinguish between color due to interference versus color due to an energy process. Briefly, colors produced by thin film interference occur at the oxidation layer - air interface, while those produced due to an energy process would be observed throughout the film. Tilting a coin while looking at the toning due to light interference will eventually result in a color not being observed. This occurs because interference color bands are only produced above the oxidation layer, and not throughout the layer. The use of colored filters between a non-fluorescent light source (or use of a laser set at a particular wavelength) and a coin's surface will result in the observation of previously observed toned regions of that color if thin film interference is the process used to produce the toning. Finally, reflected light is polarized (i.e. glare). The intensity of toning due to thin film interference can be reduced if viewed through a polarizer (i.e. polarized sunglasses).

CONCLUSION

This paper was intended to be an unbiased attempt to describe corrosion as it applies to silver coins in order to provide correct scientific information to the numismatic community. It has been my impression that many previous publications have suffered from collector bias and the repetition of misinformation that has been legitimized by its continued use (leading to additional use of this same misinformation, and so forth).

In conclusion, as stated by many before me, one should collect what one likes, appreciates, and can afford. One should not let a knowledge of actual or misrepresented science influence this decision.

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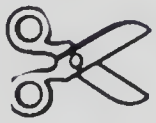

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Treasure of Xerxes
Huge Hoard of Silver Buried circa 450 B.C.

And now, as he looked and saw the whole Hellespont covered with the vessels of his fleet and all the shore and every plain about Abydos as full as possible of men, Xerxes congratulated himself upon his good fortune; but after a little while he wept. His uncle Artabanus, who was with him at the time, asked about this strange expression of contradictory feelings. "I was thinking," Xerxes replied, "and it came into my mind how pitifully short human life is..." Herodotus VII, 45-46

This moment in history described by the ancient historian Herodotus was perhaps one of the greatest military undertakings in history given the current technology. The accounts relate that the great Persian king Xerxes amassed an army of 1,700,000 for his invasion of Greece in 480 B.C. An entire city was needed to feed the army just two meals, and an entire river ran dry when they drank. And huge quantities of silver coins were struck to finance the massive military payroll and all the expenses of huge military operations. The Hellespont was the waterway at least a mile wide connecting the Black Sea and the Mediterranean Sea and separating Europe from Asia Minor. In order to move his vast army Xerxes commanded his engineers, mostly Phoenecians and Egyptians, to build a bridge. To do this 674 ships were tied together in a double row and planks were laid over the decks. The planks were covered with brushwood and dirt to create a road. Xerxes invaded Greece and very nearly succeeded in conquering the civilized world.

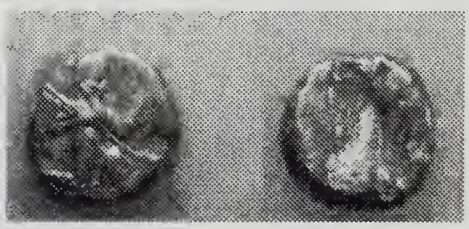
As the Persians moved through northern Greece they were met at the pass of Thermopylae, where the 300 Spartans led by Leonidas fought to the last man, and successfully delayed the Persian advance long enough for the Greek cities to prepare. Although Xerxes captured Athens, the Athenians had fled with their fleet to the nearby island of Salamis where the Persian fleet was defeated by the more experienced Athenian navy. The army of the allied Greek city-states, led by Spartans was able to defeat the Persian army at Plataea in 479 B.C. and effectively ended Xerxes' attempted conquest of Greece.

Xerxes is long dead, and his observations on the brevity of human existence still applies today, even though we average more than twice the usual life span of the ancients. By collecting, studying and handling the coins of the ancients, our human experience can be greatly enhanced. In our hands we have relics of great kings who commanded huge armies to conquer kingdoms now vanished. These treasures of precious metals that are now unearthed from the former paths of these ancient armies are sometimes the only tangible links that we have to those battles. Now you can expand your horizons to the fifth Century B.C. with a modest contribution to the Jonathan K. Kern Co.

This hoard of silver was composed of over 100 pounds of struck sigloi. A single siglos averages 5.55 grams of nearly pure silver and depicts the Great King of Persia as an archer in an action pose. Some interpret his posture as

the archaic art expression of running, and others describe him as kneeling. These coins were struck with a heavy sledge hammer on very thick oblong planchets, much like silver bullets, with a handheld upper die depicting the archer. The lower die was probably embedded in wood or stone to secure it. The lower, or reverse die of these coins, was used in the manner of the very first coins ever produced in the world. This lower die was a roughly rectangular raised metal lump, appearing in hundreds of mysterious variations. The raised reverse die created an incuse impression for the backs of the sigloi. Museum studies now in progress utilize the reverse incused impressions for quick die referencing, since the obverse impression of the Great King is frequently off center. These coins represented a huge explosion in the production of coined money, and were struck rapidly to fill the need for pre-weighed silver authorized by a powerful ruler.

The Great King is shown holding a spear and a bow on the sigloi attributed to the Asia Minor mint of Sardeis, in Lydia and a bow and dagger on the other type which are possibly all from a different mint further south. Frequently they are countermarked with tiny punches by merchants or bankers, possibly to attest to the quality of the silver. We can sell either type in a **nice fine grade for $37** each, a **nice very fine for $77** each or a **nice extremely fine for $277** each. The raised obverse always grades much less than the incused reverse so our nice fine will usually have an extremely fine reverse.



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The United States Half Dime

by Akio Lis

Although the United States Constitution (1786) granted the federal government sole authority to produce money, it wasn't until 1792 that Congress enacted legislation authorizing the construction of a mint facility in which to coin money. Specifically, the Act of April 2, 1792 established guidelines for both the construction and operation of the Mint, as well as defining the coinage that it was to produce. In Section 9, it was enacted, in part, that "Half Dismes - each to be the value of one twentieth of a dollar or unit, and to contain eighteen grains and nine sixteenth parts of a grain of pure, or twenty grains and four fifth parts of a grain of standard silver," be coined. Indeed, of all the denominations defined in this legislation, it was the half-dime (or half-disme) that was perceived as the most necessary for daily commercial transactions, and therefore the first to be coined from silver (probably not his own table settings) deposited by President George Washington for that purpose.

It has been deduced that the first federal coinage consisting of half-dimes was produced in 1792, before the Mint was completed, under the supervision of Mint officials using private facilities. These facilities consisted of either the cellar of the premises of John Harper (a sawmaker) at Sixth and Cherry Streets in Philadelphia, or a coach house at Sixth Street above Chestnut Street. This "unofficial" Mint product has been dubbed by some to be a pattern, in spite of George Washington referring to the issuance of half dimes for circulation in his annual address of November 6, 1792. The obverse of this first half dime would depict a Liberty head facing left encircled by the legend LIB. PAR. OF SCIENCE & INDUSTRY and the date below, while the reverse would have a wingspread eagle encircled by the legend UNI. STATES OF AMERICA, HALF DISME.

The first official half dime coinage would have to wait until the completion of the Mint and the bonding of the Chief Assayer, etc. Although all such initial half dimes were produced in 1795, some would be dated 1794. Over the course of its 80 year lifetime that the half dime was produced six major (and many more minor varieties, including die and minting errors/varieties) types as described below:

FLOWING HAIR (1794-1795)

Obv. Flowing Hair Liberty Head facing right flanked by eight star on the left and seven stars on the right with LIBERTY above and the date below. Rev. 'Small' spreadwinged eagle encircled by two half wreaths of laurel tied with a bowless knot, with the legend UNITED STATES OF AMER-

ICA surrounding it.

DRAPED BUST, SMALL EAGLE (1796-1797)
Obv. Draped Liberty Bust facing right flanked by eight stars on the left and seven on the right, with LIBERTY above and the date below.
Rev. 'Small' spreadwinged eagle on a mound within a wreath of laurel and palm encircled by UNITED STATES OF AMERICA.

DRAPED BUST, HERALDIC EAGLE (1800-1805)
Obv. Similar to coin previously described.

Rev. 'Large' facing Bald Eagle with spread wings holding thirteen arrows in its left talon and an olive sprig in its right talon with a Union shield on its breast and a scroll bearing the motto E PLURIBUS UNUM in its beak, and thirteen stars and six puffy clouds above between its wing with the legend UNITED STATES OF AMERICA encircling the border of the coin.

CAPPED BUST (1829-1837)
Obv.Liberty wearing a Phyrian cap facing left with seven stars to the left and six to the right, and the date below.
Rev. 'Large' spreadwinged eagle holding an olive sprig in its right talon and three arrows in its left with a Union shield on its breast, with the enscrolled motto E PLURIBUS UNUM above and 5C below, and UNITED STATES OF AMERICA encircling three quarters of the design.

LIBERTY SEATED, NO STARS (1837-1838)
Obv. Seated Liberty holding pole with cap in left hand and shield with LIBERTY in right. Date in exergue.
Rev. HALF DIME surrounded by two half wreaths of laurel tied by bow at bottom encircled by UNITED STATES OF AMERICA.

LIBERTY SEATED WITH STARS (1838-1860)
Obv. Coin similar to that previously described except encircled by thirteen stars.*
Rev. Similar to coin previously described.
* Drapery extended from left wrist beginning in 1840. Arrows were placed on either side of the date during 1853-55 to indicate an legislatively required reduction of weight.

LIBERTY SEATED WITH LEGEND (1860-1873)
Obv. Similar to above except encircled by UNITED STATE OF AMERICA.

Rev. HALF DIME surrounded by two half wreaths of corn, cotton, tobacco and wheat tied at the bottom by a ribbon with a double bow. Mintmarked below denomination.

All of the above types, except those before the Capped Bust, are available in circulated condition at reasonable prices. Few patterns were produced specifically for the half dime due to the uniformity of design for the silver pieces during these periods. A complete variety encyclopedia would be impossible to compile because melting of silver pieces during times of national emergency, economic hard times, etc. has made some possibly existing varieties difficult to find and/or confirm.

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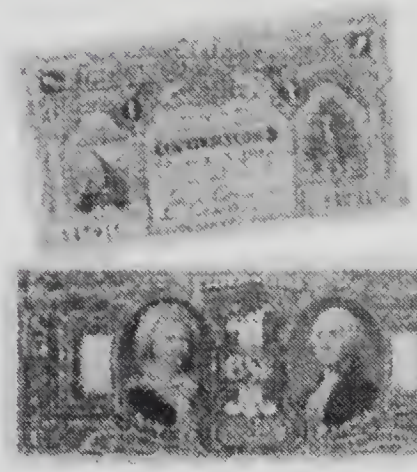

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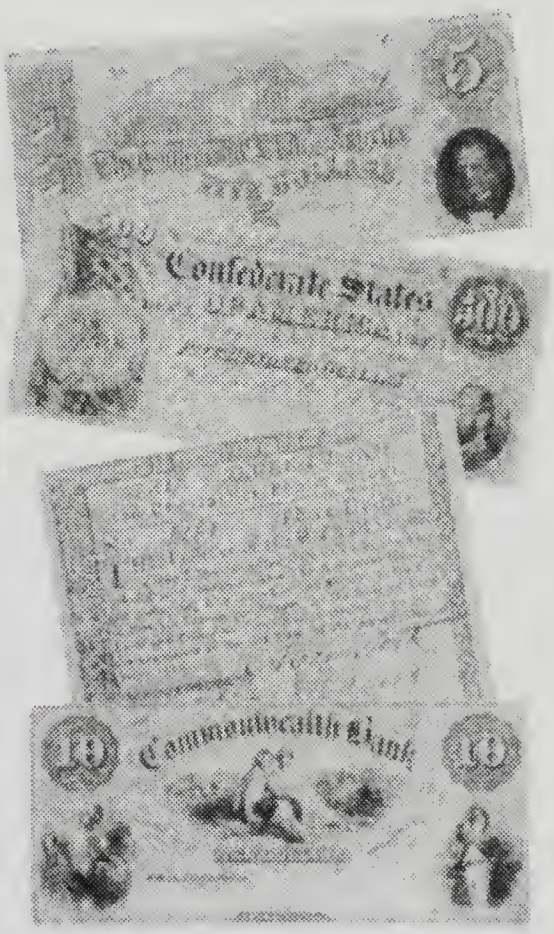

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Coin Photography Class A Snap

by Frank Passic

During the week of July 11-17, I had the honor of attending the 30th American Numismatic Association Summer Conference in Colorado Springs, Colorado with 350 other collectors and instructors. My trip was financed by a scholarship from Central States of which I am grateful, and I encourage other collectors to consider applying for this well worth numismatic scholarship.

Classes at the Summer Conference are taught by the experts in numismatics who are more than willing to share their knowledge with their students. I am continually amazed at the quality of instructors and expertise at the Summer Conference. Students took classes on a variety of topics, from coin grading to numismatics on the internet.

I took the class on coin photography taught by Tom Mulvaney, noted numismatic photographer, and Astrid Gracy, the ANA's in-house photographer. The class is limited to eight persons because of logistics, and allows for individual instruction by the teachers.

Coin photography is an art in itself and is an asset that numismatists can develop (no pun intended) as they practice and learn with the proper equipment. The instructors began the class with a list of basic photographic equipment we should consider purchasing for our own use. Mulvaney wrote an excellent article about coin photography in the July 1997 issue of Coinage, beginning on page 46, and entitled, "Picture Perfect". In it he discusses what type of camera and lens is appropriate for coin photography.

We then learned two distinct methods of taking photographs, both on copy stands. Mulvaney's method involves adjusting a 75-watt light with the camera tilted slightly at an angle. Gracy's method involves light reflected off a piece of glass at a 45 degree angle. Both methods worked and had their own advantages. We each brought our own material and photographed our items using both methods in order to learn the differences between the two and to observe the results.

The class also covered such topics as copyrights, and credits. The instructors stressed giving credit to the photographer, as they have seen photographs of their own work in auction catalogs reproduced without credit or permission in national coin club publications. Mulvaney is the official photographer for the John Jay Pittman collection auctions, and noted that how a coin is photographed could make the difference of several thousands of dollars.

Former Central States president John Wilson and his wife Nancy were in the class with me, and were able to receive special instruction on taking numismatic slides. John also grabbed some coins in the "treasure chest" at the ANA entrance for young visitors, and utilized various methods in photographing these colorful coins. It was quite interesting to observe the results of each students work as prints were made of the negatives.

Astrid is an expert in the darkroom, and was able to "improve" our prints by adjusting the exposure time on various portions of the images in order to adjust to our amateur lighting mistakes. We were all amazed at what she could do. Tom on the other hand showed us how to roll an exposed roll of black and white film on the spool in pitch darkness for developing in the canister, and the subsequent process involved using chemicals.

I brought with me a couple of photographically challenging items in my own collection to see if I could get some decent photographs. One was a blank unstruck KM-83 (Y-13) .750 silver 32 mm. Lithuanian 10 litu planchet from 1936-38 with lettered edge. The blanks with the lettered edge were prepared at the mint in Brussels, Belgium, and then shipped to the mint in Kaunas, Lithuania for striking of the obverse and reverse. This one somehow got by, and bears a beautiful deep, uncompressed lettered edge. Struck coins bear thin and compressed lettering.

The instructors showed me a method using the cone of a flashlight which reflects the image of the lettered edge. Because it is a mirror image, the lettering appears backwards on the film. But since my planchet was blank, all we had to do was flip the negative around backwards when making a print to make the lettering appear normal.

Pictured here is the blank sitting in cone of the flashlight. The lettered edge reads "VIENYBEJE TAUTOS JEGE," meaning "In Unity is National Strength."

Another "challenge" I brought was a small zinc Dahlberg radio token from my hometown Sheldon Memorial Hospital in Albion. These 17 mm. diameter tokens were used for "pay radio" in hospitals across the US earlier in this century. Many towns had these. I learned that zinc is especially hard to photograph, due to the lack of contrast. Zinc was used by several countries to strike coins during wartime, for example Belgium coins during World War II.

We found that by applying some oil to the token helped with the contrast before photographing it. By carefully adjusting the light, I was able to snap a photograph that would be reproducible for publication. Pictured here first is this token as it actually appears: dark, and hard to distinguish. Then illustrated is the same token both obverse and reverse when manipulative lighting is applied.

The knowledge I learned in the photography class is something I will always be able to use in the future, and it was well worth the trip. The instructors recommended taking classes in photography and developing at a local community college in order to build upon the specialty work we learned.

I highly recommend this particular class, especially to those who like to exhibit their collections and write articles in numismatic publications. One thing, however, this class usually fills up by time the Summer Conference brochure is sent out. If you are thinking about taking the class you need to contact the ANA to reserve your spot as space is limited to eight students.

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(Web site courtesy ANA)

Attention, Coin Clubs!

Would you like to see news of your club's activities covered in The Centinel? The editors welcome news of club happenings in the Central States region. Information on your upcoming coin show, numismatic accomplishments of your members, election of new officers, and community projects sponsored by your club are only a few examples of matters your fellow numismatists would like to read about.

Feel free to send your club news to the editors along with any photographs to make your press release more interesting.

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ADULT SCHOLARSHIP PROGRAM

The President and Board of Governors of the Central States Numismatic Society are pleased to announce the availability of an adult scholarship for Society members to attend the Summer Seminar educational program of the American Numismatic Association in Colorado Springs, Colorado. The Summer Seminar is a week-long series of educational lecturers held each year at ANA headquarters and the campus of Colorado College.

Award includes tuition, room and board, as well as coach class airfare from the airport nearest the awardee's place of legal residence. The approximate value of the award is $1,000.

Applicants should apply by letter and will be judged primarily on the basis of past contributions to organized numismatics. Examples of activities considered to enhance an application include service as a local, regional, or national numismatic organization officer; publication of numismatically related articles; a history of exhibiting at coin shows and other numismatic exhibitions; as well as service on the staff of local, regional, or national coin shows or numismatic conventions.

To receive a copy of the adult scholarship guidelines write to:
Brian E. Fanton, P.O. Box 81, Hiawatha, IA 52233-0081

YOUNG NUMISMATIST SCHOLARSHIP PROGRAM

The President and Board of Governors of the Central States Numismatic Society are pleased to announce the availability of a scholarship for YN members to attend the Summer Seminar educational program of the American Numismatic Association in Colorado Springs, Colorado. The Summer Seminar is a week-long series of educational lectures held each year at ANA headquarters and the campus of Colorado College.

Award includes tuition, room and board, as well as coach class airfare from the airport nearest the awardee's place of legal residence. The approximate value of the award is $1,000.

Applicants must be between 13 and 17 years of age as of January 1, 1999.

Applicants must be a CSNS member in good standing for a period of at least one (1) year prior to applying for a scholarship application.

Recipients of a CSNS scholarship in previous years are ineligible to win again. YN's will be judged mainly on their activities and contributions to CSNS; for their accomplishments in school, church, and community; and may not have attended the ANA Summer Seminar on a scholarship from another organization. Preference will be given to applicants residing within the CSNS region.

For a copy of CSNS Young Numismatist scholarship guidelines and application write to:

Ray Lockwood, 2075 E. Bocock Road, Marion, IN 46952-8799

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Outstanding YNs get insider's look at PCGS' Portland grading room

Three award-winning young numismatists - two of them from the CSNS region - took an exclusive, behind-the-scenes visit of the Professional Con Grading Service (PCGS) grading room set up at a hotel conference room in Portland, Oregon during the American Numismatic Association (ANA) convention in August.

During the recent ANA convention, PCGS Founder David Hall (left) conducted an intensive grading room discussion with outstanding YNs Steven R. Roach, John S. Brush and Christine M. Frazer, and PCGS President Rick Montgomery (back to camera).

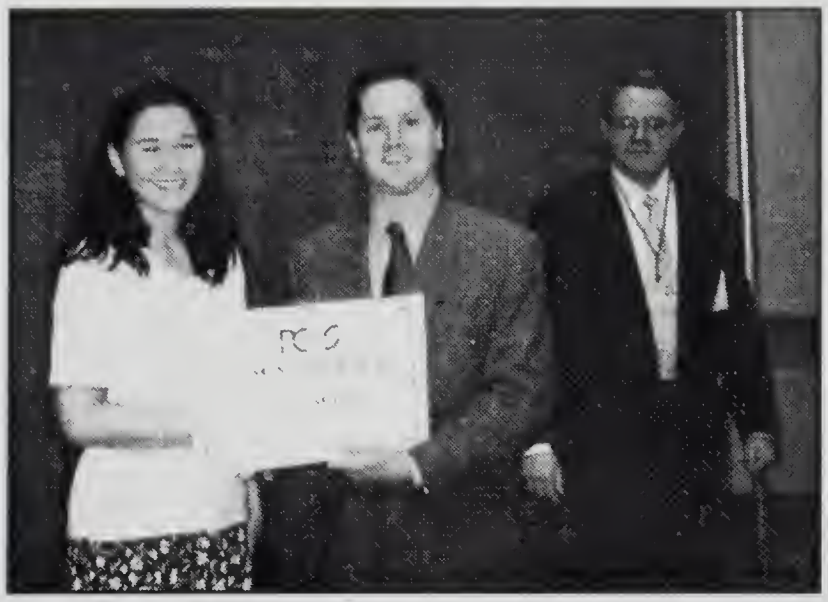
Their "tour guide" was PCGS Founder and Chief Executive Officer, David Hall, who spent more than 90 minutes discussing authentication and grading while the YNs intensely viewed coins examined and graded minutes earlier by PCGS staff.

Taking part in the visit were Christine M. Frazer, 17, of Indiana, winner of the $5,000 PCGS 1998 Scholarship Contest prize; Steven R. Roach, 18, of Michigan, winner of the 1996 contest; and John S. Brush, 18, of South Carolina.

"Young collectors are the future of numismatics and we want to do everything we can to encourage them to stay with the hobby," Hall explained. "These three students certainly knew their coins and gave us their opinions if they believed we were too high or too low on certain grades. It was a hands-on educational experience."

Normally, no one but PCGS staff members are ever allowed to enter the guarded grading room, either at PCGS headquarters in Newport Beach, California or at major conventions where on-site grading is conducted. An exception was made for the outstanding students. The coins they examined were housed in protective PCGS encapsulation holders immediately prior to the final determination of grade by PCGS staff.

During the ANA awards ceremony in Portland, Frazer received her $5,000 scholarship prize from PCGS President, Rick Montgomery, who also participated in the students' grading room seminar with Hall and PCGS graders Myles Standish and Ron Howard.



Christine M. Frazer, 18, accepts a $5,000 college scholarship essay award from PCGS President Rick Montgomery (center) while ANA President Anthony Swiatek looks on.

PAN COIN SHOWS

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Dealer set-up October 22, 4-8 p.m.
MAY 7, 8, 9, 1999
Dealer set-up May 6, 4-8 p.m.
OCTOBER 22,23,24, 1999
Dealer set-up October 21, 4-8 p.m.
MAY 12, 13, 14, 2000
Dealer set-up May 11, 4-8 p.m.
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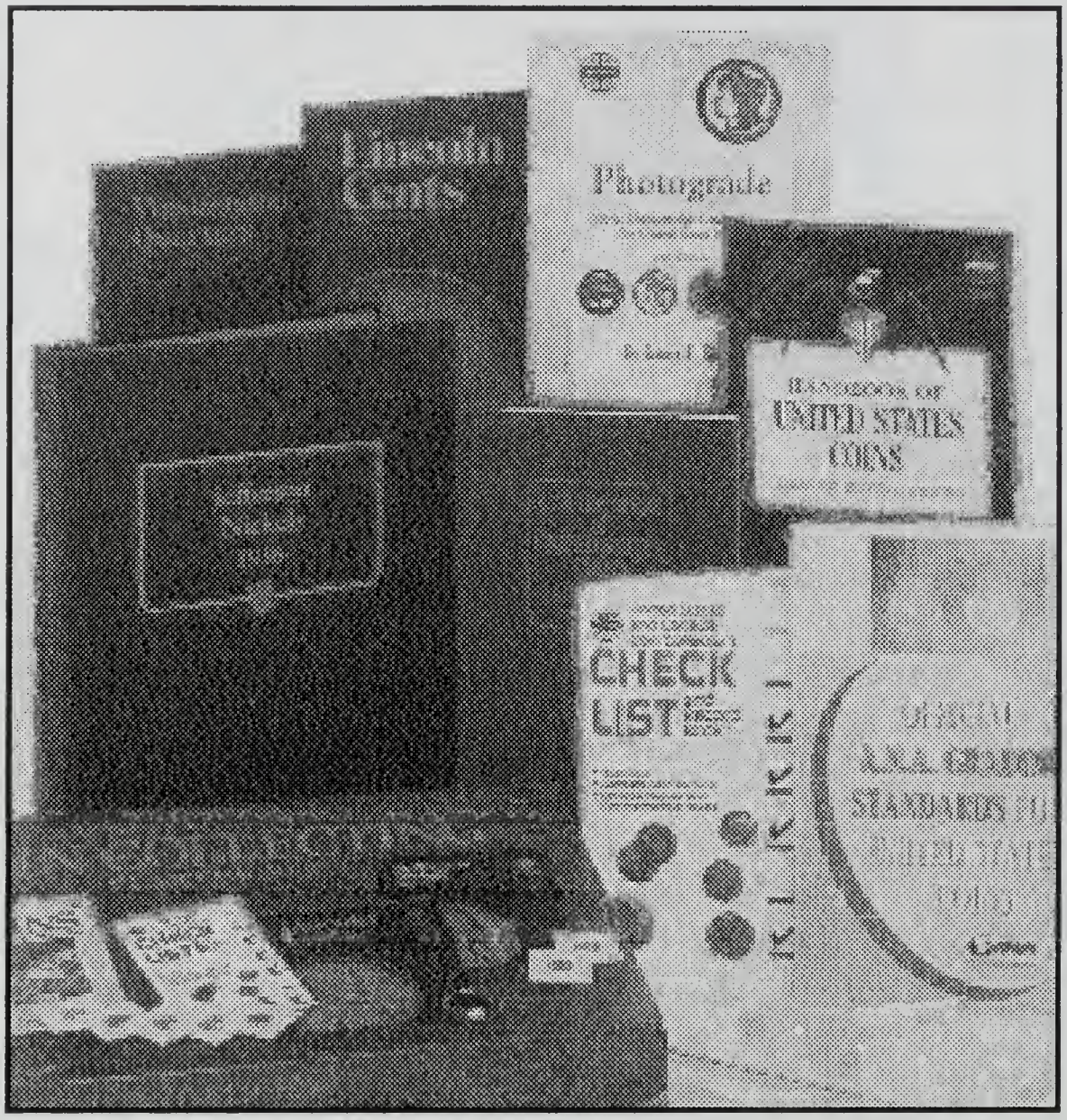

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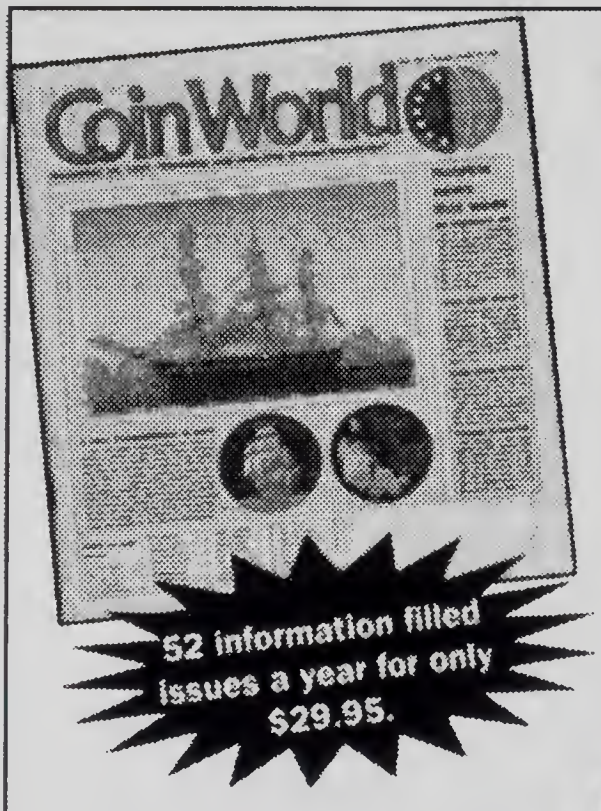

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Club News at the ANA in Portland

Bob Hendershott is named Numismatist of the Year on his 100th Birthday. Marjorie Owen Hendershott holding citation, ANA President Anthony Swiatek, and ANA Interim Executive Director Ed Rochette.

Steven Roach receives a NLG award from Wendell Wolka for best article in a regional publication. His article was published in the fall 1997 issue of *The Centinel.*

The Centinel receives a first place regional publication award. Pictured are ANA Governor Helen Carmody, ANA Governor John Wilson, ANA President Anthony Swiatek and Rudy Bahr. *The Centinel* is edited by Karen & Jim Jach.

CENTRAL STATES NUMISMATIC SOCIETY ADVERTISING RATES

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Show Calendar

Show Chairman are invited to send announcements of upcoming coin shows in the Central States region. The Show Calendar is intended to assist collectors and dealers in planning their show attendance. It is also designed to aid show sponsors in avoiding date conflicts. **Show dates should be sent 6 to 12 months in advance.** Please include the city where the show will be held, official name of the show, show dates and location, as well as the name, address and phone number of the show or bourse chairman. Send to Jim or Karen Jach, P. O. Box 21766, Milwaukee, WI 53221.

1998 SHOW CALENDAR

ST. LOUIS, MISSOURI – OCTOBER 22-25

National & World Paper Money 13th Annual Convention, Henry VIII Hotel, 4690 N. Lindberg Blvd., St. Louis, MO. Kevin Foley, P. O. Box 573, Milwaukee, WI 53201. 414/481-7287, fax 414/481-7297

LOUISVILLE, KENTUCKY – OCTOBER 23-25

Kentucky State Numismatic Society 38th Annual Coin Show sponsored by the Louisville Coin Club, Executive Inn, 879 Phillips Lane, Louisville, KY 40213. Harry Tileston, P.O. Box 43744, Louisville, JY 40253-0744. 501/244-2555

GURNEE, ILLINOIS – OCTOBER 25

Indian Hill Coin Club Show, Gurnee American Legion Post 771, 749 N. Milwaukee Ave. Mike Hanninen, 2400 Ave., Zion, IL 60099. 847/872-2725.

KALAMAZOO, MICHIGAN - NOVEMBER 7

Kalamazoo Numismatic Coin Club Show, Kalamazoo County Fairgrounds, Room E, 2900 Lake Street, Kalamazoo, MI. John Vrbancic, P.O. Box 19013, Kalamazoo, MI 49019. 616/344-9919.

KENOSHA, WISCONSIN – NOVEMBER 8

Kenosha Coin Club 41st Annual Show, Kenosha Union Club, 3030 39th Avenue, Kenosha, WI 53142. Jerry Binsfeld, Box 191, Pleasant Prairie, WI 53158. 414/654-6272

PEKIN, ILLINOIS – NOVEMBER 14

Pekin Coin Club sponsored by the Tazewell Numismatic Society 5th Holiday Coin Show, Miller Center, 551 S. 14th Street, Pekin, IL.

OAK FOREST, ILLINOIS – NOVEMBER 29

Oak Forest Coin Club 18th Annual Coin & Collectible Show. Orland Park Civic Center, 14750 Ravinia (one block west of Rte. 45/LaGrange Rd.) Ron Johnson, P.O. Box 286, Oak Forest, IL 60452. 708/422-8953.

OMAHA, NEBRASKA – DECEMBER 12-13

Omaha Coin Club 39th Annual Coin Show, Holiday Inn Central, I-80 and 72nd St., Omaha, NE. Tim Taysen, P.O. box 435, Bellevue, NE. 68005-0435 800/310-6902.

1999 SHOW CALENDAR

MUNCIE, INDIANA – JANUARY 24

Muncie Coin Club's 42nd Annual Show, Ball State University, 2200 University Avenue, Student Center - Cardinal Hall, Muncie, IN. Ray Saylor, P.O. Box 1184, Muncie, IN 47304. 765/288-0371

ROCKFORD, ILLINOIS – FEBRUARY 7

Rockford Area Coin Club 85th semi-annual coin show, Holiday Inn Hoffman House, 7550 E. State St., Ralph Winquist, 1004C Street, Rockford, IL 61007 815/963-0396

ROSEMONT, ILLINOIS – FEBRUARY 18-21

Chicago Paper Money Exposition 5th Annual Show, Ramada O'Hare Hotel, 6600 N. Manheim Road, Rosemont, IL. Kevin Foley, P. O. box 573, Milwaukee, WI 53201. 414/481-7287, Fax 414/481-7297.

COLUMBUS, OHIO – MARCH 26-27

CNS/Coins 1st Annual Coin Club Show, Veterans Memorial Auditorium, 300 West Broad St., Columbus, Ohio. Bill Kamb, 224 Olentangy Ridge Place, Powell, Ohio 43065. 614/436-9771.

MILWAUKEE, WISCONSIN – APRIL 8-10

South Shore Coin Club's 35th Annual Show, The Grand Milwaukee Hotel, 4747 S. Howell Avenue, Milwaukee, WI. Annette Tramte, 2368 S. 59th St., West Allis, WI 53219. 414/541-7028.

MILWAUKEE, WISCONSIN – APRIL. 22-25

Central States Numismatic Society's 60th Annual Convention, Wisconsin Center, Milwaukee, WI. Jerry Lebo. P.O. Box 841, Logansport, IN 46947. 219/753-2489.

ROSEMONT, ILLINOIS – APRIL 8-11

Chicago International Coin Fair 24th Annual Show, Ramada O'Hare Hotel, 6600 N. Manheim Road, Rosemont, IL. Kevin Foley, P.O. Box 573, Milwaukee, WI 53201. 414/481-7287, FAx 414/481-7297.

CINCINNATI, OHIO – SEPTEMBER 10-12

Greater Cincinnati Numismatic Exposition 16th Annual Show, Drawbridge Convention Center, I-75 & Buttermilk Pike, Ft. Mitchell, KY. Paul Padget, 726 W. Wyoming Ave., Cincinnati, OH 45215. 513/821-2143.

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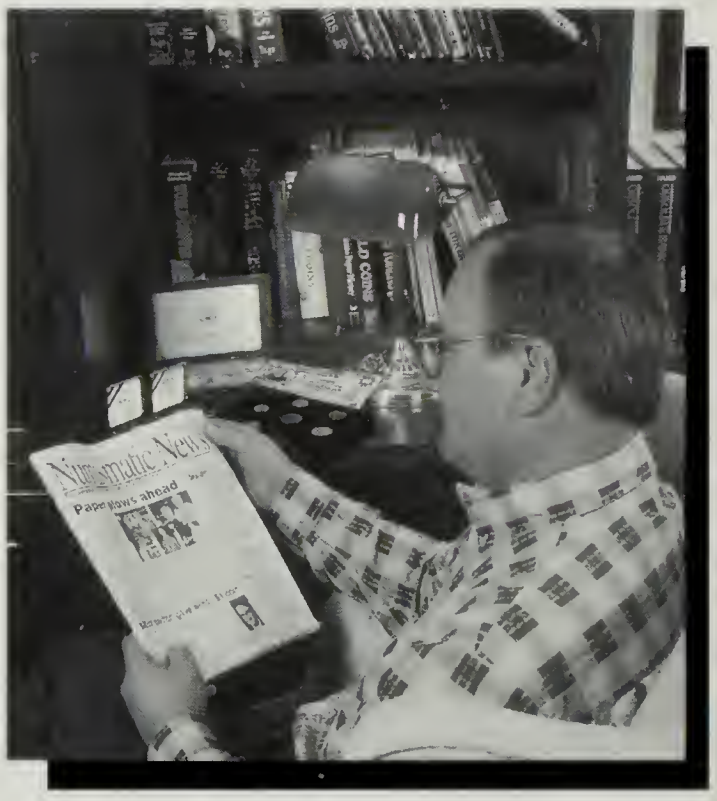

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